siliceous sand." Actually, microscopic examination of the thin section by Dr. C. S. Ross, of the U. S. Geological Survey, and Miss Anna Shepard, of the Laboratory of Anthropology, Santa Fe, N. Mex., showed that the matrix is a partially baked clay containing a small amount of coarse-grained material. The latter includes free quartz grains, a little feldspar, hornblende, mica, garnet, and zircon, a considerable amount of fine-grained, iron-stained sandstone, limestone, and calcite, and a few fragments of what apparently are reworked bits of clay previously used for pottery. The object was baked at only a moderate temperature, as is demonstrated by the fact that, although the clay has lost its plasticity, the carbon dioxide has not been driven from the limestone and calcite.

I had hoped that a minute examination of this object would show the personal signature of its maker, but I am not convinced that the obscure and delicate striations present in a few spots actually are baked fingerprints. Nevertheless, the object is so clever a copy of an original ear of Peruvian maize that the maker must be credited with having been an artist of superior skill. The questions as to who made this object and when, where, and why it was made must now be referred to the ethnologists and archeologists. The answers may throw some light on the interesting problems concerning the origin and early cultivation of maize.

This episode of a supposed ear of fossil maize may be closed fittingly with the pointing of a moral, particularly pertinent to paleontologists: Be not deceived by external appearances.

ZOOLOGY.—*Affinities of the Brachyuran fauna of the Gulf of California.*[1] STEVE A. GLASSELL, San Diego Society of Natural History. (Communicated by WALDO L. SCHMITT.)

The author having obtained numerous specimens of Brachyura from the Gulf of California during two collecting trips, and having studied the results of other collectors in that region, believes that a brief summary of the fauna of that region in comparison with that of the regions to the north and south would be of general interest to carcinologists.

The interesting relationship of the Panamian fauna to that of the Gulf of Mexico need not be considered here since this has been discussed by Walter Faxon,[2] but the distribution of tropical (Panamian)

[1] Received December 26, 1933.

[2] Mem. Mus. Comp. Zool. Harvard College, **18**: 231–50. 1895.

Brachyura in the Gulf of California has not been heretofore studied to any extent, and it seems probable that an infusion of southern forms into the Gulf of California has had much to do in making up the character of the rich fauna which is now known to exist in the latter region.

In general it is in the Gulf of California that the tropical species make their most northerly advance on the Pacific coast of North America, although of course some few species have their most northern limits far north of the Gulf. For these northern species it may be difficult to determine whether they originated in northern or southern latitudes. Even a study of their Bathymetric zones does not clarify the situation. To cite a single instance. *Pinnixa affinis* Rathbun was dredged in the Bay of Panama by the *Albatross* in 26 fathoms, March 30, 1888. On October 20, 1933, a specimen was dredged off Newport Bay, California, in 20 fathoms. The inference must be that there is a connecting link between these wide flung stations, that this little crab must be included in the fauna of the Gulf of California, because the Gulf is bracketed between the discovery station and this latest find. Yet to which fauna shall it be allocated? At present this is a matter of personal opinion.

Arbitrary boundaries are taken so as to form a base on which to work. This will exclude some tropical and northern forms from this fauna, which will no doubt be included in the light of future research. I take as the boundaries, for purposes of this paper, those which admit of fewer occasional or accidental intrusions of species into the area bounded by, and including the waters impounded to the north of a line drawn from Cabo San Lucas, in Lower California, to the Port of Mazatlan, in the State of Sinaloa, Mexico, and also the fauna reported and found on the West Coast of Lower California, at Magdalena Bay. In this delimitation of range no attempt is being made to establish or admit of faunal barriers.

Also we will only consider species of Brachyuran Crustacea of the three major groups, namely, the Cancroid or Cyclometopous crabs, the Grapsoid or Catometopous crabs, and the Spider crabs or Oxyrhyncha. The total number of species of the three groups, found within these boundaries is 197, a very large list when we consider that we are dealing with just a part of the marine decapods. For example Dr. Waldo L. Schmitt[3] lists only 181 marine decapods as known to occur within the 100 fathom line off the coast of California.

[3] The Marine Decapod Crustacea of California. Univ. of Calif., vol. 23: 281. 1921.

A summary of the total number of species of the three groups is as follows:

Cancroid crabs reported in the Gulf of California,	77	species.
Grapsoid " " " " " " "	54	"
Spider " " " " " " "	66	"
Total of all species reported	197	

The intrusion of Panamian species into the Gulf of California, number 96 or 48 per cent of all the species reported in these writers. They are divided as follows:

Cancroid crabs	39	species, or	50+	per	cent
Grapsoid "	25	"	" 46+	"	"
Spider "	32	"	" 48+	"	"
Total of three groups	96 species, or 48+ per cent				

The above percentages represent the percent which the Panamian species bear to the total number of species in each family group. Further intensive study and collecting will no doubt show that the Anomuran tribe and the remaining families of the Brachyuran tribe will bear a like relationship to the Panamian fauna.

Another interesting summation is a table showing the number and percentages of species that are indigenous to the Gulf of California.

Cancroid crabs	27	species, or	35+	per	cent
Grapsoid "	22	"	" 41+	"	"
Spider "	26	"	" 39+	"	"
Total of three groups	75 species, or 40—per cent of all				

Then the insignificant influence that northern species play in the Gulf of California fauna, may be visualized by a glance at the following table.

Northern intrusion of species in the Gulf of California.

Cancroid crabs, northern species	11	or	14+	per	cent
Grapsoid " " "	5	"	9+	"	"
Spider " " "	8	"	12+	"	"
Total of three groups	24 or 12+ per cent of all				

A recapitulation of the foregoing tables, based on a total for the three groups of 195 definitely allocated species, (two of the 197 species are doubtful in this locality), is as follows:

Panamian species in the Gulf, total	96 species, or 48+ per cent

Indigenous species in the Gulf, total 75 species, or 40− per cent
Northern " " " " " 24 " " 12+ " "

There have been three expeditions in the Gulf of California which have added materially to our knowledge of the fauna of that region. They were, the two *Albatross* expeditions of 1891 and 1911, and the expedition of the California Academy of Sciences in 1921. As before stated it was my good fortune to collect in this territory during part of the years 1931–32–33. A partial summary of the results of this collecting, confined to the three before mentioned groups is:

Cancroid crabs, total of species	. . .	47	or 61+ per cent of species
Grapsoid " " " "	. . .	32	" 60+ " " " "
Spider " " " "	. . .	33	" 50+ " " " "
Total of species taken		112	or 56+ per cent

Many new locality records were obtained, extending the range of some species more than 25° of Latitude to the north. In the list of species to follow no extension of range is indicated if the distance is less than 100 miles, nor is extension of range given to that species unless specimens were collected at new localities. In all 46 new locality records are recorded, 18 of these are introductions to the fauna of the Gulf.

As a great deal of the information in this paper is of necessity a compilation, I wish to express my deep appreciation to Dr. Mary J. Rathbun of the United States National Museum, not only for her monographs but also for her personal attention to my efforts.

To facilitate reference to the list of species reported from the Gulf of California, these symbols are used after the name of the author of the species.

A	Indicates	Panamian species
B	"	Northern species, those found on west coast of North America, north of Magdalena Bay, Lower California.
C	"	Indigenous species
D	"	Apparently indigenous species extending their range a short way either north or south of Cape St. Lucas.
E	"	Species collected by the author.
F	"	New locality records of this collection.
(?)	"	*Tentative identification*

Spider Crabs

MAJIDAE

Stenorynchus debilis (Smith) A E
Podochela vestita (Stimpson) C E
Podochela hemphillii (Lockington) B E
Podochela latimanus (Rathbun) C E
Inachoides laevis Stimpson A E F
Erileptus spinosus Rathbun B E F

Eucinetops lucasii Stimpson C
Eucinetops rubella Rathbun C E
Eucinetops panamensis Rathbun A E
Euprognatha bifida Rathbun B E
Collodes granosus Stimpson C
Collodes tenuirostris Rathbun C D
Collodes tumidus Rathbun C D
Batrachonotus nicholsi Rathbun C D
Pyromaia tuberculata (Lockington) A B E
Dasygyius depressus (Bell) A E
Acanthonyx petiverii Milne Edwards A E
Epialtus sulcirostris Stimpson C D
Epialtus minimus Lockington C E
Eupleurodon trifurcatus Stimpson C
Taliepus nuttallii (Randall) B
Pugettia venetiae Rathbun B
Mimulus foliatus Stimpson B
Leucippa pentagona Milne Edwards A
Sphenocarcinus agassizi Rathbun A
Pelia tumida (Lockington) B C
Notolopas lamellatus Stimpson A E F
Herbstia camptacantha (Stimpson) C D
Herbstia parvifrons (Randall) B E
Herbstia tumida (Stimpson) C D
Libinia setosa Lockington C E
Libinia mexicana Rathbun C E
Lissa aurivilliusi Rathbun A
Lissa tuberosa Rathbun C
Hemus analogus Rathbun C E
Thoe sulcata Stimpson C D E
Pitho picteti (Saussure) A E
Pitho sexdentata Bell A E
Anoptychus cornutus Stimpson A E
Mithrax (Mithrax) spinipes Bell A E
Mithrax (Mithrax) orcutti Rathbun A
Mithrax (Mithrax) armatus Saussure C
Mithrax (Mithrax) tuberculatus Stimpson A
Mithrax (Mithrax) sinensis Rathbun C
Mithrax (Mithrax) sonorensis Rathbun C E
Mithrax (Mithraculus) denticulatus Bell A E
Mithrax (Mithraculus) areolatus (Lockington) A B
Teleophrys cristulipes Stimpson A
Stenocionops contigua Rathbun C E
Stenocionops macdonaldi (Rathbun) A
Stenocionops triangulata (Rathbun) A
Macrocoeloma heptacanthum (Bell) A
Macrocoeloma villosum (Bell) A
Microphrys platysoma (Stimpson) A E
Microphrys branchialis Rathbun C D E
Microphrys triangulatus (Lockington) A E

PARENTHOPIDAE

Parenthope (Parthenope) hyponca (Stimpson) A
Parthenope (Platylambrus) exilipes (Rathbun) A
Parthenope (Pseudolambrus) triangulata (Stimpson) C
Thyrolambrus erosus Rathbun C
Leiolambrus punctatissimus (Owen) A
Tyche lamellifrons Bell A E
Mesorhoea bellii (A. Milne Edwards) A E
Aethra scruposa scutata Smith A E
Cryptopodia hassleri Rathbun C E
Heterocrypta macrobrachia Stimpson A E F

Cancroid Crabs

PORTUNIDAE

Portunus (Portunus) xantusii (Stimpson) B E
Portunus (Portunus) asper (A. Milne Edwards) A
Portunus (Portunus) panamensis (Stimpson) A
Portunus (Achelous) brevimanus (Faxon) A
Portunus (Achelous) minimus Rathbun C E
Portunus (Achelous) pichilinquei Rathbun C E
Portunus (Achelous) affinis (Faxon) A
Portunus (Achelous) tuberculatus (Stimpson) A
Portunus (Portunus) iridescens (Rathbun) C
Callinectes bellicosus Stimpson C D E
Callinectes ochoterenai Contreras C
Callinectes arcuatus Ordway A E
Callinectes toxotes Ordway A
Arenaeus mexicanus (Gerstaecker) A E
Cronius ruber (Lamarck) A E
Euphylax robustus A. Milne Edwards C

ATELECYCLIDAE

Pliosoma parvifrons Stimpson C

CANCRIDAE

Cancer amphioetus Rathbun B
Cancer anthonyi Rathbun B
Cancer gracilis Dana B

XANTHIDAE

Carpilodes cinctimanus (White) A E F
Platypodia rotundata (Stimpson) A E F
Actea sulcata Stimpson A E F
Glyptoxanthus meandricus (Lockington) C E F
Daira americana Stimpson A E F
Lipaestheius leeanus Rathbun A E
Medaeus lobipes Rathbun A
Medaeus spinulifer (Rathbun) A
Cycloxanthops vittatus (Stimpson) A
Cycloxanthops novemdentatus (Lockington) B E F
Leptodius occidentalis (Stimpson) A E
Xanthodius sternberghi Stimpson A
Xanthodius hebes Stimpson C E F
Xanthodius stimpsoni (A. Milne Edwards) A E F
Lophoxanthus lamellipes (Stimpson) A E F
Metopocarcinus truncatus Stimpson A
Lophopanopeus heathii Rathbun B
Lophopanopeus frontalis (Rathbun) B E F
Lophopanopeus lockingtoni Rathbun B E
Lophopanopeus maculatus Rathbun CE
Panopeus purpureus Lockington A
Panopeus chilensis Milne Edwards and Lucas A
Panopeus bermudensis Benedict and Rathbun A E F
Panopeus diversus Rathbun C E
Neopanope peterseni Glassell C E
Hexapanopeus orcutti Rathbun O E F
Hexapanopeus sinaloensis Rathbun C E F
Hexapanopeus rubicundus Rathbun C E
Eurypanopeus ovatus (Benedict & Rathbun) C E F
Eurypanopeus planus (Smith) A
Eurypanopeus planissimus (Stimpson) C E F
Eurypanopeus confragosus Rathbun C E
Eurytium affine (Streets & Kingsley) C E
Eurytium albidigitum Rathbun C E
Micropanope latimanus Stimpson B
Micropanope xantusii (Stimpson) A E F
Micropanope polita Rathbun A E
Micropanope areolata Rathbun B E
Paraxanthias insculptus (Stimpson) A
Pilumnus xantusii Stimpson C
Pilumnus spinohirsutus (Lockington) B E
Pilumnus townsendi Rathbun C E
Pilumnus conzalensis Rathbun C E
Pilumnus depressus Stimpson C
Pilumnus pygmaeus Boone A E F (?)
Pilumnus limosus Smith A E F
Pilumnus stimpsoni Miers C
Pilumnus tectus Rathbun C E
Heteractaea lunata (Milne Edwards & Lucas) A E F
Acidops fimbriatus Stimpson A E F
Ozius verreauxii Saussure A
Ozius perlatus Stimpson A E
Ozius agassizii A. Milne Edwards A E F
Eriphia squamata Stimpson A E F
Quadrella nitida Smith A
Trapezia digitalis Latreille A

Grapsoid Crabs

GONEPLACIDAE

Trizocarcinus dentatus (Rathbun) C
Euryplax polita Smith A E F
Speocarcinus granulimanus Rathbun C E
Speocarcinus californiensis (Lockington) B E F
Oediplax granulata Rathbun C
Glyptoplax pugnax Smith A E F
Chasmocarcinus latipes Rathbun C

PINNOTHERIDAE

Pinnotheres angelicus Lockington C E F
Pinnotheres lithodomi Smith A E F
Pinnotheres muliniarum Rathbun C
Pinnotheres goncharum (Rathbun) B E F
Pinnotheres pubescens (Holmes) C E
Pinnotheres margarita Smith A
Pinnotheres reticulatus Rathbun C
Pinnotheres jamesi Rathbun C
Pinnotheres pichilinquei Rathbun C
Fabia granti Glassell C E
Parapinnixa nitida (Lockington) C E F

Dissodactylus nitidus Smith A E F
Pinnixa transversalis (Milne Edwards & Lucas) A E F
Pinnixa tomentosa Lockington B E F
Pinnixa occidentalis Rathbun B
Pinnixa affinis Rathbun A
Tetrias scabripes Rathbun C

CYMOPOLIIDAE

Cymopolia zonata Rathbun C E F
Cymopolia lucasii (Rathbun) C
Cymopolia fragilis Rathbun A

GRAPSIDAE

Grapsus grapsus (Linnaeus) A E F
Geograpsus lividus (Milne Edwards) A E F
Goniopsis pulchra (Lockington) A E
Pachygrapsus crassipes Randall A B E
Pachygrapsus transversus (Gibbes) A E
Planes minutus (Linnaeus) A B E
Planes marinus Rathbun B
Goetice americanus Rathbun C E F
Tetragrapsus jouyi (Rathbun) C E F
Sesarma (Sesarma) sulcatum Smith A E F
Sesarma (Holometopus) magdalenensis Rathbun C E F
Cyclograpsus escondidensis Rathbun C E
Plagusia depressa tuberculata Lamarck A
Percnon gibbesi (Milne Edwards) A E F

GECARCINIDAE

Cardisoma crassum Smith A;
Ucides occidentalis (Ortmann) A
Gecarcinus planatus Stimpson A E

OCYPODIDAE

Ocypode occidentalis Stimpson A E F
Uca monilifera Rathbun C E
Uca princeps (Smith) A
Uca mordax (Smith) A E F
Uca brevifrons (Stimpson) A
Uca macrodactylus (Milne Edwards & Lucas) A
Uca crenulata (Lockington) B D E
Uca coloradensis (Rathbun) C E
Uca musica Rathbun C E F
Uca latimanus (Rathbun) A E

ZOOLOGY.—*The morphology and development of the preparasitic larvae of* Poteriostomum ratzii.[1] JOHN T. LUCKER, Bureau of Animal Industry. (Communicated by BENJAMIN SCHWARTZ.)

INTRODUCTION

The preparasitic larvae of the numerous species of small strongyles (Strongylidae of genera other than *Strongylus*) parasitic in the large intestine of horses have not been described, except in the case of *Triodontophorus tenuicollis*. The literature relating to this group of nematodes contains a number of publications dealing with the structure and development of their free-living larvae, but the available information is without reference to species, with the one exception noted above. The following is a brief summary of the literature pertaining to the preparasitic development of the small strongyles of horses.

In 1866, Baillet (3) published observations on the preparasitic development of *Sclerostoma tetracanthum* Diesing, 1851. As is well

[1] Received March 2, 1934.